

## A Time to Remember

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*To mark the centenary of the sinking of RMS Titanic on 15 April 1912, the National Maritime Museum (NMM) put on an exhibition entitled Titanic Remembered, which highlighted some of the stories told by survivors of the disaster to Walter Lord, who wrote the book A Night to Remember on which the 1957 film of the same name was based. When the exhibition closed at the end of September 2012, there was a brief opportunity to research one of the Museum's evocative Titanic-related items, an 18-carat gold open faced pocket watch, before it returned to its usual permanent display. This paper discusses the study of the pocket watch using X-ray imaging and computed tomography (CT) and evaluates the outcomes of the investigation.*

The National Maritime Museum is home to one of a number of recovered watches, referred to as 'Titanic watches', which bear witness to the sinking of the ship, RMS Titanic, in the early hours of 15 April 1912 with their hands stopped (very probably) at the time they entered the water. The NMM's Titanic watch (Fig. 1) is a powerful and poignant example as its hands are stopped at 3.07 between a rust stained dial and glass; the second hand has deteriorated completely, but the witness mark in the rust on the dial suggests that it indicated 32 seconds when it stopped.

The time shown is intriguing as it is forty seven minutes later than the official recorded time of sinking and the majority of known Titanic watches show times close to 2.20. There is an obvious query: was the NMM watch running when it was submerged in the seawater? Given that this pocket watch has no waterproofing features, it is probable that the watch would have stopped in under a minute after immersion. This article will outline the process of studying the watch and investigate the business of Ship Time, exploring potential explanations for the disparity between the official time of sinking and the time shown by the watch.

The watch's owner, 27-year old Robert Douglas Norman (Fig. 2), joined the Titanic at Southampton as a second class passenger,



Fig. 1. Robert Douglas Norman's 18 carat gold open-faced key-wound pocket watch. NMM ref. ZBA0004. © NMM.

intending to visit his brother in Vancouver and perhaps start a new life. Norman did not take the White Star Line's boast of the new liner's invulnerability as a guarantee of safe passage. A recently discovered letter to his brother, written the day before departure,

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Fig. 2. Robert Douglas Norman (1884-1912).  
© NMM.

communicates his wishes in case of an untimely death; the letter served as his last will and testament and is copied into the register of inventories in Edinburgh Sherriff Court.<sup>1</sup> As a male passenger, Norman's chances of surviving the disaster were poor at best and his body was one of over 300 recovered by the cable ship, *Mackay-Bennett*. He was buried in Nova Scotia and the watch, amongst other effects, was returned to his elder brother and passed down through the family until it was donated to the Museum in 1995.

At this stage in the watch's history, the known-technical details were limited to the exterior features. At the back of the watch there are two hinged gold covers. The outer cover can easily be separated from the watch as the pin that it hinged on has long since rusted away, but the inner cover with a single winding aperture remains unopened. From the hallmarks inside the outer cover it is

known that the watch case was made around 1874/75 by Oliver and Edwards of London. There is also what appears to be a repairer's mark dated 24/10/11, which suggests that the watch was looked after and capable of healthy running before it stopped.

The inner cover is shut tight and attempting to open it would inevitably damage the joint and might damage or dislodge weakened internal components. As this relic is a memorial to its late owner and the disaster, dismantling the watch was not an option. X-ray technology seemed the ideal route toward a better understanding of the watch movement, its condition and maybe learning something of its maker. If it were an English fusee watch, as was supposed, and the watch were running when it was immersed in 1912, an X-ray scan should reveal a portion of the fusee chain partially coiled around the fusee.

The watch and another *Titanic* relic, a musical toy pig, were examined at a commercial facility<sup>2</sup> that produces high resolution X-ray equipment that is normally used for doing failure analysis and checking the internal quality of precision-dependent objects with complex internal structures, such as electronic chips, automotive parts and aircraft turbine blades. The technology used to examine the two *Titanic* objects was developed relatively recently in order to analyse the Antikythera mechanism, an ancient Greek geared astronomical calculator. The original scanner was sent to Greece in 2005 and enabled the first internal examination of the gearing for the first time in around two thousand years.

The scanning process takes around twenty minutes, during which time the object is rotated 360° between the X-ray emitter and the flat panel detector, which is principally a scintillator made up of 2000 x 2000 photodiodes behind a light-proof screen. The data is fed to a computer and converted into tiny building blocks called voxels, each representing 32.6µ<sup>3</sup> (cube dimensions approximately 0.03mm) which are then put together to create the 3-D model. Once created it is possible to cut through any plane and look inside the model. Rendering of the inner surfaces is also possible thanks to

1. National Records of Scotland RD15/6 July 1912/22.

2. Nikon Metrology, X-Tec Systems Ltd. Tring, Hertfordshire, UK.

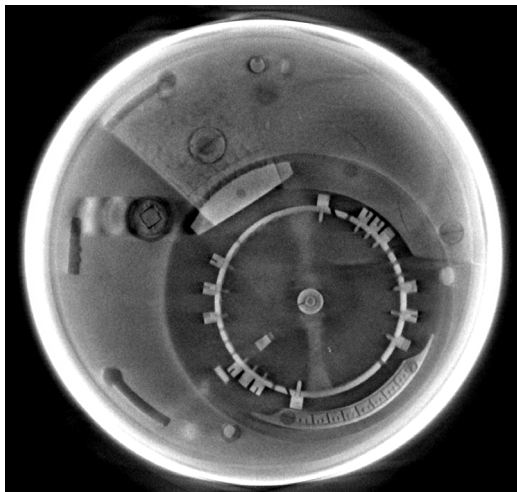


Fig. 3. CT imaging showing the watch's full plate movement and the balance wheel in cross section. © NMM.

software developed initially for the computer game industry. Seeing the watch movement on screen for the first time was both an exciting and moving experience, despite this being in a virtual sense, since it was the first time that it had been seen for over a century.

The CT scans revealed the type of movement with clarity. As was typical with English watches, the serial number [in this case 2730] was repeated throughout the movement on various components. It was even possible to read the punch-marked numbering on the inner surface of the mainspring barrel. The movement's frame is characteristic of those made in Lancashire in the nineteenth century. The calibre size of '12 0/4' is punched on the pillar plate beneath the dial: '12' refers to the diameter of the plates, which is quite small for a gent's watch, and '0/4' to the distance between the plates. As had been expected it is a fusee movement but with full plate, not a three-quarter plate as had been conjectured previously.

The scans revealed that the watch had a temperature compensated balance and decorative foliate engraving on the balance cock enclosed by a gilt brass cap (Fig. 3). From the 3-D model we found the movement to be in reasonably sound condition. Unsurprisingly, the more delicate steel components such as the balance spring had completely disintegrated but the pinions and arbors survived intact and the scans show



Fig. 4. Through manipulation of the images the signature on the barrel bar became decipherable as SHORRO... © NMM.

that the corrosion has not seriously affected their integrity.

However, clarity was limited to the central parts of the watch. The maker's signature was barely visible on the barrel bar, partly because it is lightly engraved, but also because the gold case interfered with the X-ray process. Gold has a high atomic mass and so acts in similar fashion to lead, deflecting X-ray particles. This problem was further compounded by the curvature of the case parts. Many hours were spent viewing the twelve slices through the signature, each one voxel thick. Tone, contrast and shadows were manipulated with photo-editing software to assemble possible combinations of letters which were evaluated and tested against lists of clock and watch makers. The tail end of the signature was totally obscured by the gold case but, after much manipulation, the letters *SHORRO*... appeared to be most likely (Fig. 4). Standard lists did not reveal anything, but two similar gold pocket watches, sold at auction in



Fig. 5. Showing the relative positions of the fusee hollow and the spring barrel. © NMM.

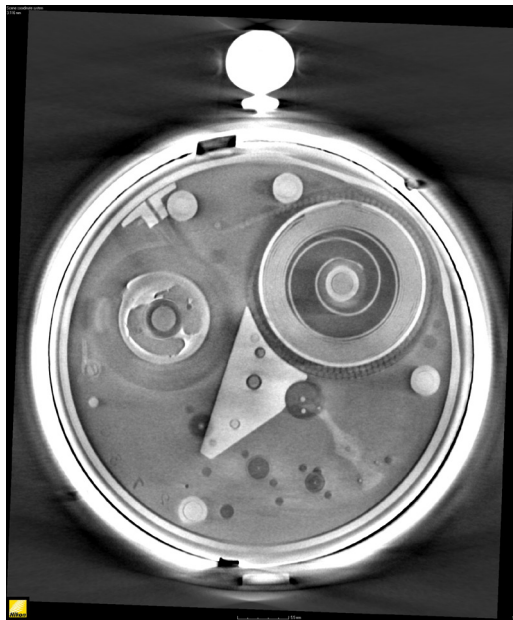


Fig. 6. A slice through the CT model that shows the fusee chain, resting on the pillar plate, and the position of the impulse pin relative to the lever. © NMM.

2011,<sup>3</sup> bore the name Shorroek on the barrel bar. Both watches had enamel dials signed by Thomas Yates of Friargate. One was signed Shorroek and the other Bennett Shorroek.

Returning to the original question as to whether or not the watch was running at the time of its immersion, the X-ray CT scans did not provide a clear-cut answer. Fig. 5 shows a cross-section that details the spring barrel and the wider end of the fusee, showing the hollow that accommodated the chain's hook. The fact that the hollow is on the opposite side to the mainspring barrel suggests that the watch may well have been running. From this image it is clear that the chain is detached from the fusee and that the mainspring is fractured. It seems likely that the anchor pin inside the fusee hollow had rusted away after the event and that the resultant release of tension caused the mainspring to fracture. This conjecture is supported by the location of the fracture on the second coil just above the outer end of the spring.

Searching for the end of the fusee chain was surprisingly difficult. It either disappears into the fog caused by the curvature of the gold case or is not evident because it has rusted away. Fig. 6 shows the best image of

the chain, which is largely resting on the potence plate, coiled loosely around the barrel and leading off around the fusee cone. The position of the escapement in this image is also troublesome. The impulse pin shows brightly in the scan and is on the wrong side of the lever, which may suggest that either the escapement mis-locked and the watch was therefore not running or that the balance's position had changed after its spring had deteriorated.

In summary, the scans show that the watch was partly wound when it entered the water, but might not have been running owing to failure of the escapement's safety action. However, conjecture that the watch was working remains practical as the time shown sits comfortably with the circumstances and, indeed, the fact that Norman was wearing the watch in his last hours. Additionally, a brief explanation of how time was kept on board the ocean liner, given during the subsequent inquiry into the disaster, may support an explanation of the discrepancy between the time shown on the watch and the official time of sinking.

3. Tennants auctioneers, sale Thursday 17 November 2011, lots 456 and 457,



Fig. 7. The recovered watch of Edmund Stone, Bedroom Steward on E deck, indicates about 2.17. The watch was auctioned as part of the Edmund Stone Titanic Collection by Henry Aldridge & Son, Devizes in October 2008. © Aldridge Auctioneers.

The inquiry, chaired by Senator William Alden Smith, ran for eighteen days over a period of around six weeks and the findings

were submitted to the US Senate on 28 May 1912. The statement given by the ship's Third Officer, Mr H.J. Pitman, details how the forty



Fig. 8. The watch belonging to Carl Oscar Vilhelm Gustafsson Asplund, third class passenger, indicated around 2.19. The watch was auctioned by Henry Aldridge & Son, Devizes in April 2008. © Aldridge Auctioneers.



Fig. 10. A watch belonging to another third class passenger, Malkolm Johnson, indicates 1.37. Auctioned by Bukowski's, Stockholm in 2009. © Bukowski's Auctioneers.



Fig. 9. The body of Steward Sedunary was also recovered by the *Mackay-Bennett* and his watch indicates around 1.50. From the collection of the SeaCity Museum, Southampton. © Southampton City Council Arts and Heritage Collections.

eight slave clocks on board, supplied by Magneta Time Co. Ltd. were adjusted at midnight from the chart room, so that they

would read close to true local time at noon the following day. The adjustment was an estimate based on the ship's course and speed and, if necessary, the clocks would be adjusted by a few minutes to correspond with true local time just before midday.<sup>4</sup>

Given the westerly direction and average speed of the *Titanic*, the daily adjustment would have been a retardation of about 45 minutes per day and so it is possible that Norman's watch was working and that he had not set it since the previous day. If one compares Norman's watch against the known unrestored *Titanic* watches, this surmise is plausible.

Both Stone's and Asplund's pocket watches (Figs 7 and 8) indicate the approximate time of sinking and so were almost certainly running and set to ship's time at the point of disaster. Sedunary's watch (Fig. 9), however, indicates 1.50 – a full half-hour disparity. This

4. Examination of Mr H.J. Pitman, Third Officer, *'Titanic' Disaster Report* (Washington Government Printing Office, 1912), p. 294.

difference could be due to one of three circumstances: that the watch was not running, Sedunary had somehow entered the water early or, more likely, that he had adjusted his watch to approximate to an anticipated retardation of clocks on board the ship. The midnight clock change did not occur that night; the Third Officer, Pitman, explained at the inquiry that 'they [the crew] had something else to think of.'<sup>5</sup> Malcolm Johnson's watch (Fig. 10), showing 1.37, suggests that he too had anticipated the daily clock change and had set his watch back accordingly.

These four watches are all distinctly different from Norman's watch in that they are keyless and therefore easier to reset than a key-wound watch. A pocketknife would be needed for the process of opening the glazed bezel on Norman's watch in order to set the hands to time and, indeed, such a knife was among his recovered personal effects.<sup>6</sup> It was (and still is) commonly advised that one should wind and set one's watch in the morning, to get the best performance from it during the day. But, a second class cabin would not have had a slave clock to enable him to set his watch to ship time and so it seems sensible, given the delicacy required to set the time on Norman's watch, to suggest that he would have done this in his cabin before retiring for the night. The disparity between Norman's and the other watches makes sense, if this was his custom and that he had retired before midnight on the 13th of April.

Though peripheral to the study of Norman's watch, there are two other recovered *Titanic* timekeepers that are worth mentioning: a pocket watch that was almost certainly not running at the time of being submerged and one of the *Titanic*'s marine chronometers.<sup>7</sup> The watch indicates 10.50 and was retrieved among luggage belonging to third class passenger, William Henry Allen, whose body was never recovered. In contrast to Allen's

watch, the box chronometer, signed by J. Wray & Co. of Liverpool, has generated considerable debate and intrigue, as the gold hands read 10.39.

If one believes that the chronometer's hands have not been placed in position and that it was running at the time of the disaster, the most likely explanation is that the chronometer was set to Eastern Standard Time (EST). Bearing in mind that Ship Time was based on the ship's predicted longitude for noon the following day, this surmise is a distinct possibility. The precise location and role for this chronometer on board the *Titanic* is unclear but there is a precedent for use of chronometers set to EST on transatlantic steamers in an article, published in 1870, that spoke of 'the chronometer, which carries with it the New York or Liverpool time, and shows, by comparison with the time of the ship, the easting or westing that has been made.'<sup>8</sup>

Time was not only critical to navigation, but also to the subsequent inquiry when the problems with using elastic Ship Time came to the fore. Particularly when correlating the wireless telegraphy between the *Titanic*, other vessels and land stations. Essentially, each ship had its own unique time zone which was a dependent on its direction and speed. These problems and others contributed towards the passing of the Radio Act of 1912 in America and later in 1918 the adoption of the use of time zones at sea following the recommendations of the 1917 Conference for Timekeeping at Sea.

From a passengers' point-of-view, perhaps the most pressing time-related issue on board was when to dine. Contemporary White Star Line pamphlets used ship's bells rather than hours and minutes to demarcate mealtimes. The passengers were thereby sheltered from the convolution of Ship Time. This, combined with the awkwardness of setting the time on a key-wound watch, may account for Robert Douglas Norman's continuance of his daily

5. See previous note.

6. The inventory of Norman's personal effects is listed on the on-line *Encyclopaedia Titanica*, last checked 3 July 2016. <http://www.encyclopedia-titanica.org/titanic-victim/robert-douglas-norman.html>

7. Both of these objects were among around 5,500 objects recovered from the wreck site in 2005 in an operation managed by the Titanic Salvage Company.

8. 'The Ocean Steamer', in *Harper's New Monthly*, XLI no. 242 (1870), p. 192.

winding routine without a pressing need for it to concur with the ship's slave dials.

One-hundred years on from the tragic end to Norman's life, the study of his watch by X-ray scanning and computed tomography has delivered a good working knowledge of the watch's movement, its condition and provided a view, albeit clouded, of a name engraved on the barrel bar. The scans did not provide an unshakable answer as to whether or not the watch was running at the time of immersion in the cold sea water but, study of the then old fashioned pocket watch and the management of Ship Time on board the

*Titanic* offered a plausible scenario that could explain the inconsistency between the hands of the watch and the official record.

Importantly, the relatively new process of X-ray scanning and computed tomography has provided an extraordinary volume of technical information on Norman's watch and others, such as the fire damaged watches recovered from Dresden.<sup>9</sup> Moreover, this information was gathered without compromise to the delicate condition of the watch, which remains a powerful reminder of a tragic historical incident.

9. *Antiquarian Horology* 36/3 (June 2015), 382.